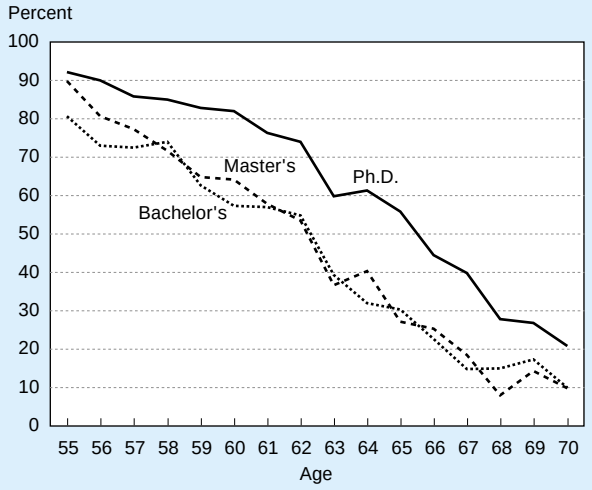
Figure 3-14.
Older S&E degree holders working full-time



See appendix table 3-22. *Science & Engineering Indicators – 2000*

Text table 3–18.
Percentage of 1995 S&E Ph.D.s leaving full-time employment by 1997: by sector of employment in 1995

Age in 1995	Four-year schools	For profit company	Govern-ment	All sectors
51–55	3.2	4.8	4.2	4.9
56–60	9.2	14.8	7.2	11.1
61–65	24.6	26.6	13.6	25.7
66–70	35.7	56.3	38.4	39.1
71–73	40.6	55.3	—	41.8

SOURCE: National Science Foundation, Division of Science Resources Studies (NSF/SRS), 1995 and 1997 Survey of Doctorate Recipients.

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ployment between 1995 and 1997 by sector of employment.[27] Within each age group, a smaller proportion of S&E Ph.D. holders employed in 1995 at four-year colleges and universities, or by the government, left full-time employment than S&E Ph.D. holders as a whole, or those employed by for-profit companies.

While slower retirement for S&E Ph.D. holders, particularly those in academia, is significant and of some policy interest, it is important to recognize that this does not mean that academic or other Ph.D. holders seldom retire. Indeed, figure 3-14 shows that their retirement patterns are much more like those of bachelor's and master's degree holders than they are different—retirement is just delayed two or three years. Even the two-year transition rates for academia in text table 3-18 shows more than a third of those aged 66–70 leaving full-time employment over a two-year period.

One reason academic Ph.D. retirement rates have been of interest has been a concern that the academic tenure system, combined with the end of mandatory retirement under U.S. antidiscrimination laws, could lead to continued employment of many less productive professors. Text table 3-19 compares two-year transition rates of leaving full-time employment for S&E Ph.D. holders employed full-time in 1995 at four-year institutions, by the number of articles they said they published within the previous five years. Within each age group, those writing six or more articles had a much lower transition rate out of full-time employment than those reporting fewer articles written. For those between the ages of 51 and 65, the transition rate for academics with zero articles was more than double the rate for those with six or more.

Projected Demand for S&E Workers

During the 1998–2008 period, employment in S&E occupations is expected to increase at almost four times the rate for all occupations. Though the economy as a whole is anticipated to provide approximately 14 percent more jobs over this decade, employment opportunities for S&E jobs are expected to increase by about 51 percent, or about 1.9 million jobs. (See text table 3-20.)

Approximately four-fifths of the increase in S&E jobs will occur in computer-related occupations. Overall employment in these occupations across all industries is expected to almost double over the 1998–2008 decade, with more than 1.5 million new jobs being added. Jobs for computer engineers and scientists are expected to increase from 914,000 to 1,858,000, while employment for computer systems analysts is expected to grow from 617,000 to almost 1.2 million jobs. (See the sidebar, "What Did Computer Workers Get Degrees In?")

Text table 3-19.
Percentage of 1995 S&E Ph.D. recipients at four-year institutions leaving full-time employment: by number of articles published in 1990–95

Age in 1995	No articles	1–5 articles	6 or more articles	All
51-55	5.7	3.5	1.0	3.2
56-60	12.2	8.6	6.7	9.2
61-65	32.6	23.5	16.1	24.6
66-70	—	43.1	28.0	35.7
71-73	—	—	28.1	40.6

— = Not available

SOURCE: National Science Foundation, Division of Science Resources Studies (NSF/SRS), 1995 and 1997 Survey of Doctorate Recipients.

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[27] As a practical matter, it would be difficult to calculate many of the measures of retirement used previously in this chapter by sector of employment. A two-year transition rate, however, can be calculated using the NSF/SRS SESTAT data file matched longitudinally at the individual level.

Text table 3-20.
Total S&E jobs: 1998 and projected 2008
(Numbers in thousands of jobs)

	1998	2008	Change
Total, all occupations	**140,514**	**160,795**	**20,281**
All S&E occupations	3,809	5,747	1,937
Scientists	2,347	3,995	1,647
Life scientists	173	219	45
Computer, mathematical, and operations research occupations	1,653	3,182	1,529
Computer systems analysts, engineers, and scientists	1,530	3,052	1,522
Computer engineers and scientists	914	1,858	944
Systems analysts	617	1,194	577
Mathematical scientists	123	131	8
Physical scientists	200	229	29
Social scientists	321	365	44
Engineers	1,462	1,752	290

See appendix table 3-28. *Science & Engineering Indicators – 2000*

Within engineering, electrical-electronic engineering is projected to have the biggest absolute and relative employment gains, up by 93,000 jobs, or about 26 percent. Civil and mechanical engineers are also expected to experience above-average employment gains, with projected increases of about 21 and 16 percent, respectively. Employment for all engineering occupations is expected to increase by an average of approximately 20 percent.

Job opportunities in life science occupations are projected to grow by 26 percent (45,000 new jobs) over the 1998–2008 period; at 35 percent, the biological sciences are expected to experience the largest growth (28,000 new jobs). Employment in physical science occupations is expected to increase by about 15 percent, from 200,000 to 229,000 jobs; slightly less than half of the projected job gains are for chemists (13,000 new jobs).

Social science occupations are expected to experience only average growth (14 percent) over the decade, largely because of the modest employment increases anticipated for psychologists (11 percent or 19,000 new jobs). Economists, however, are projected to experience more favorable job growth (19 percent or 13,000 new jobs).

Foreign-Born Scientists and Engineers in the United States

In April 1997, 26.1 percent of holders of doctorates in S&E in the United States were foreign born. This is shown in text table 3-22 with data from the 1997 NSF/SRS SESTAT data file, a large national sample of those with U.S. S&E degrees and those with foreign S&E degrees who were in the United

What Fields Did Computer Workers Get Degrees In?

In 1993 only 28.5 percent of college graduates employed in computer occupations had computer science degrees, with another 2.9 percent having degrees in the closely related field of computer and systems engineering and 6.7 percent in the sometimes closely related field of electrical engineering (text table 3-21).* Perhaps reflecting the role of business departments and schools in initially introducing computer training on many campuses, 17.7 percent had business degrees. Altogether, 32.5 percent of those in computer occupations in 1993 had degrees in fields outside science, engineering, or technology (SE&T), and another 29.6 percent had degrees in SE&T fields not directly related to computing. This picture is very different for computer workers under age 30: 45.2 percent have computer science degrees, 4.9 percent degrees in computer and systems engineering, and 8.9 percent in electrical engineering. Only 16.5 percent had degrees in non-SE&T fields.

*1993 is the only year in the 1990s for which both field of degree and occupation are available on a major workforce survey for all college graduates. The 1993 SESTAT file augmented with the non-S&E records from the 1993 National Survey of College Graduates provides a valid national sample for this population.

Text table 3–21.
Field of highest degree for 1993 computer job holders

	(Percent)		
Field of highest degree	All ages	Age < 30	Age 30+
Computer sciences	28.5	45.2	25.4
Mathematics	8.9	6.6	9.3
Life sciences	2.1	0.6	2.4
Physical sciences	3.5	2.0	3.8
Social sciences	7.0	6.5	7.1
Computer & systems engineering	2.9	4.9	2.5
Electrical engineering	6.7	8.9	6.3
Mechanical engineering	1.2	1.2	1.2
Other engineering	3.0	2.9	3.0
Business	17.7	10.5	19.0
Education	4.2	0.6	4.9
Technology	3.9	4.5	3.8
Humanities	6.1	2.7	6.7
Other non-S&E	4.5	2.7	4.8
Total (n = 1,243,300)	100.0	100.0	100.0

— = Data not available.

SOURCE: National Science Foundation, Division of Science Resources Studies (NSF/SRS), SESTAT Data file, 1993.

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